FORE SYSTEMS®

ForeThought® **Software for** *ASX*,™ *TNX*,™ **and** *ForeRunner*® **ATM Switches**

Release Notes
Software Version 5.3.x

MANU0151-07, Revision A
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1.0 General Description of Software Release

These release notes highlight features that have been added to or changed in the *ForeThought* ® 5.3.x release.

2.0 System Requirements

ForeThought 5.3.x supports the *ForeRunner* ® *ASX* ™-200BX, *ASX*-200WG (16 MB version only), *ASX*-1000, *ASX*-4000, *ForeRunnerLE* ® 155, *ForeRunnerLE* 25, *TNX* ™-1100, and *TNX*-210 ATM switches.

If you have a CEC-Plus timing module installed in your *ASX*-1000 or *TNX*-1100, <u>all</u> SCPs within the *ASX*-1000 or *TNX*-1100 must be upgraded to the same release so that the CEC-Plus distributed timing function operates properly. Additionally, if you upgrade all of the SCPs to *ForeThought* 5.3, the CEC-Plus must also be upgraded with the CEC-Plus *ForeThought* 5.3 release. If the CEC-Plus and the switch SCP(s) are not running the same release, the protocols are incompatible and an error message results.

> **NOTE** The May 14, 1998 version of the *CEC-Plus Release Notes* incorrectly state that the order of upgrade does not matter. You must upgrade the SCPs first and then upgrade the TCM.

There will be a temporary disruption in timing until the upgrade is complete. Please read the note about CEC-Plus upgrades in Section 4.1.1 before you perform the upgrade.

If you have any *FramePlus™* network modules installed in your *ASX*-200BX, *TNX*-210, *ASX*-1000, or *TNX*-1100 and you upgrade the switch software to *ForeThought* 5.3, all of the *FramePlus* network modules must also be upgraded to *FramePlus* software application version 1.1.2 using `conf mod fram upgrade`. If the *FramePlus* network modules and the switch SCP(s) are not running the same release, the protocols are incompatible and an error message results.

3.0 New Features

3.1 Support for the *ASX*-4000

ForeThought 5.3.x supports the new *ForeRunner ASX*-4000 ATM switch, which is designed specifically to meet the demanding needs of large enterprise and emerging service provider networks. The *ASX*-4000 is a scalable, non-blocking 40 Gbps ATM switch that provides the world's first OC-48c∕STM-16c ATM interface and up to 64 ports of OC-12c∕STM-4c in a highly reliable, compact chassis. This switch offers up to two Pentium Pro switch control processors, up to four switch fabrics, dual fan trays, and redundant AC or DC power supplies.

All components—power supplies, port cards, fan trays, switch control processors (SCPs) and switch fabrics—can be removed and inserted, or hot-swapped, while the switch is in operation. Redundant, load-sharing power supplies and redundant fans are standard features. A redundant, standby SCP is optional, and supports for PVCs and PVPs non-service affecting SCP failures and software upgrades, also known as PVC∕PVP connection preservation. See Section 3.3 in these release notes for more information about connection preservation. For more information about the *ASX*-4000, see the *ForeRunner ASX-4000 ATM Switch Installation and Maintenance Manual*.

3.2 Support for the *ForeRunnerLE* 25

The *ForeRunnerLE* 25 ATM Workgroup Switch delivers high-performance switching capacity and speed for ATM applications. A non-blocking switching capacity of 2.5 Gbps is continually available on this switch. The *ForeRunnerLE* 25 provides up to 24 ports of connectivity, each running at speeds of 25 Mbps. An optional Port Expansion Module (PEM) can provide up to four additional ports of 155 Mbps or one 622 Mbps port. For more information, see the *ForeRunnerLE ATM Workgroup Switch Installation and Maintenance Manual*.

3.3 PVC/PVP Connection Preservation

Connection preservation maintains all existing PVCs and PVPs without disruption of cell flow whenever an SCP fails over or is rebooted. For more information about connection preservation, see Section 12.3 in Part 2 of the *AMI Configuration Commands Reference Manual*.

3.4 Support for SVPs/SPVPs

ForeThought 5.3.x offers support for Switched Virtual Paths (SVPs) and Soft Permanent Virtual Paths (SPVPs). SVP signalling is provided according to the UNI 4.0 Specification. ATM Forum PNNI SPVPs are also provided. Similar to the Soft Permanent Virtual Connections (SPVCs) already offered, an SPVPs is a path that goes across multiple switch fabrics. You configure a Permanent Virtual Path (PVP) on each endpoint switch, and the two ends establish an SVP between them. SPVPs provide a robust configuration because the SVP portion is re-established automatically by the end switches if any link fails along its channel. For more information about SPVPs, see Section 11.2 in Part 2 of the *AMI Configuration Commands Reference Manual*.

3.5   CEM Idle Channel Suppression

ForeThought 5.3.x includes CEM Idle Channel Suppression, which is a method used to detect active and inactive timeslots in a TDM trunk in an ATM network based on Circuit Emulation Services (CES). An idle timeslot is a timeslot in a connection through which no useful data is transmitted; e.g., the end users may be silent in a voice connection. An active connection is one in which at least one timeslot is not idle, and an inactive connection is one in which all of the timeslots are idle.

Because the CES services are CBR services, when a CES connection is created, the switch allocates a fixed amount of bandwidth, depending on the number of timeslots used. When idle channel suppression is enabled on a CES connection, the CES network module transmits only the cells of active connections to the switch fabric. Thus, only a fraction of the bandwidth allocated for the connection is used. The egress network module detects that there is less than the contracted cell rate arriving on the CES connections, and re-allocates the extra bandwidth to other existing VBR, ABR, and UBR connections, but does not exceed their contracted cell rates. Additionally, the egress network module guarantees the constant bit rate for CES connections whenever they want to reclaim the bandwidth. For more information about idle channel suppression, see Appendix B of the *ATM Switch Network Configuration Manual.*

3.6   Support for ILMI 4.0

ForeThought 5.3.x includes support for the mandatory elements of the ILMI 4.0 specification. FORE's ILMI 4.0 supports auto-configuration of type and version of the signalling entity (UNI/NNI) and VCI/VPI range negotiation between FORE and non-FORE devices with ILMI 4.0 and ILMI 3.x support. When switches running *ForeThought* 5.3.x attempt to discover the attributes of devices attached to them, they first use ILMI 4.0.

3.7   Web-based Element Manager

In addition to previous management interfaces, this release of *ForeThought* provides a method of ATM switch configuration and management through an easy-to-use HTML (Hypertext Markup Language) interface using a web browser such as Netscape Navigator or Microsoft's Internet Explorer. The Element Manager presents a better visual display when using Netscape 4.x or Microsoft Internet Explorer 4.x, however, the Element Manager is also supported by Netscape 3.x and Microsoft Internet Explorer 3.x.

The web-based Element Manager provides a graphical interface with a simple structure that uses internet presentation attributes common in the HTML environment such as pages, frames, and tables.

The Element Manager provides a graphical interface to many of the ATM Management Interface (AMI) commands that allow you to configure and query various hardware and software aspects of switches and network modules.

To access the Element Manager, simply enter the IP address of your switch in the URL Location field of the browser. At the login screen, you must enter your username. On a new switch running *ForeThought* 5.3.x, the default username is ami. This username is assigned a null password.

When you access a switch, the user interface for the Element Manager supports two frames. The left frame provides the list of specific menu items organized by functionality. The right frame provides access to the various parameters relating to the selected menu item.

> **NOTE**
>
> On-line help for each menu item is available in HTML format from any display. You can get on-line help by clicking on the blue display title found on each page of the Element Manager interface.
>
> By default, these help files are linked to FORE's external web site. You can change the default location of the help files using `conf http help_url`. See Part 1 of the *AMI Configuration Commands Reference Manual* for more information.

3.8   Load-Balanced UBR Routing

Load-balanced UBR routing lets you configure the switch to distribute the UBR SPVCs that it establishes more evenly across available links. Earlier releases of *ForeThought* balance UBR connections among links with identical capacity, but if the link choices have different capacities, the higher one is always used. (For example, given a choice among three OC3c links, earlier releases balanced the connections; but if the choice was between an OC12c and two OC3cs, all UBR connections were placed on the OC12c). Since UBR circuits are treated as if they consumed no bandwidth, the higher-rated link could become increasingly congested.

By enabling this feature, UBR calls are distributed evenly based on the estimated bandwidth of individual calls and on the percentage of usage among all available links, such that the percentage of available bandwidth on any given link is maximized.

You can assign an estimated bandwidth value, which is then used by routing to determine if any particular link has the available bandwidth to support the connection, and to provide an estimate of traffic flow through any link in the network. This information is also used by path computation when calculating routes. For more information about load-balanced UBR routing, see Section 4.3.1 in Part 1 of the *AMI Configuration Commands Reference Manual*, and Section 11.1.2.7.4 and Section 15.1 in Part 2 of the *AMI Configuration Commands Reference Manual*.

4.0 Known Issues or Concerns

4.1 Upgrade Considerations

4.1.1 FT 5.3 Release

The following section discusses upgrade issues that pertain specifically to *ForeThought* 5.3.x.

FLASH Size - *ForeThought* 5.3.x occupies more non-volatile (FLASH) memory than earlier *ForeThought* releases did as shown in the following table.

SCP Type	Switch Platform	FT 5.3 Image Size
SCP-ASXCF	LE 155 and LE 25	2.17 MB
SCP-ASXHA	ASX-200BX, TNX-210, ASX-1000, TNX-1100,	2.5 MB
SCP-ASXP5	ASX-200BX, TNX-210, ASX-1000, TNX-1100,	2.68 MB
SCP-ASXP6	ASX-4000	2.46 MB

As a result, only one code image will fit on Switch Control Processors (SCPs) with 3MB or 4MB of FLASH. Therefore, you must delete the earlier release to make room for *ForeThought* 5.3.x. You will be asked to do so when you perform an **oper upgrade** command. For SCPs with 8MB of FLASH, these procedures are not needed; there is room to keep both the old and new releases in FLASH.

To determine the amount of FLASH on your SCP, use the **oper env cpu** command and look at the `FlashSize` field. To determine how much space you have left on your FLASH, use the **oper flash free** command. If there is not enough space to store the new image, you need to manually delete some files to make room for it. Use **oper flash dir** to list the files and **oper flash delete** to remove them.

If a failure occurs during the upgrade, the switch will temporarily have no *ForeThought* image at all. If your switch is configured to use a bootp server, it will recover automatically by re-loading *ForeThought* into memory. You can then repeat the **oper upgrade** command to load *ForeThought* into FLASH as well.

In addition to using a bootp server, you can copy the Mini Loader into FLASH along with the *ForeThought* release. Then, if the upgrade fails, you can interrupt the switch re-boot sequence, start the Mini Loader, and repeat the **oper upgrade** operation. For more information about the Mini Loader, see the *ATM Switch Installation and Maintenance Manual* for your switch.

Upgrade and Downgrade Procedures - *ForeThought* 5.3.x automatically imports configuration information when upgrading an *ASX*, *TNX*, or *ForeRunnerLE* switch from *ForeThought* 4.1.x, 5.0.x, 5.1.x, 5.2.x, or SP 1.0.x. To upgrade from one of the earlier *ForeThought* releases listed here, you should back up your CDB (using **oper cdb backup**), and then upgrade directly to 5.3.x (using **oper upgrade**).

Downgrades, however, do not automatically export configuration information to the earlier version. You will only be able to access the switch through the serial port. The FLASH is reformatted during this process.

If you absolutely need to downgrade a switch running *ForeThought* 5.3.x to *ForeThought* 4.1.x, 5.0.x, 5.1.x, 5.2.x, or SP 1.0.x, you must perform the following steps on a console connected to the serial port:

1. Back up the CDB of the switch running *ForeThought* 5.3.x (using **oper cdb backup**).
2. Downgrade to *ForeThought* 4.1.x, 5.0.x, 5.1.x, 5.2.x, or SP 1.0.x (using **oper upgrade**) and reboot the switch.
3. Perform a FLASH init (using **oper flash init**).
4. If needed, re-assign the IP address and default route information, and reboot over Ethernet.
5. Perform an **oper upgrade** again of the older version, but DO NOT reboot the switch.
6. Restore the CDB of the version that you downgraded to in step 2 (using **oper cdb restore**) and reboot the switch.

If you have any questions about changing between software versions, contact FORE Technical Support.

Upgrade Tar Files - The software upgrade tar file is specific to the switch/processor platform. There are four tar files: one for i960-based SCPs in an *ASX*-200BX or *ASX*-1000; one for Pentium-based SCPs in an *ASX*-200BX or *ASX*-1000; one for *ForeRunnerLE* 155 or *ForeRunnerLE* 25 switches; and one for *ASX*-4000 switches. During the upgrade process, ensure you download the correct tar file for the switch/processor you are using.

SPANS and FT-PNNI Upgrade Considerations in *ASX*-4000 Networks - *ForeThought* software provides support for older protocols including *ForeThought* PNNI and SPANS signalling. The *ASX*-4000 uses AAL5 encapsulation for these protocols. Other FORE switches, instead, use AAL 3/4 encapsulation by default. If you are running these older protocols on an *ASX*-4000, you must statically configure any other FORE switches to use AAL 5 on their connections to the *ASX*-4000. To statically configure these connections, use **conf spans delete** and **conf spans new** *<port> <vpi>* **-aal 5**.

CEC-Plus Upgrades - The configuration values for the CEC-Plus are not preserved when upgrading to *ForeThought* 5.3, and are not recovered through a restoration of a *ForeThought* 5.2.x CDB. Those values must be re-entered manually. This is a fairly quick operation. Before performing the upgrade, note the current configuration values using `conf timing references` and `conf timing show`. Then upgrade the switch and CEC-Plus to *ForeThought* 5.3. Use AMI to re-apply these values. If you are using automatic mode, enter the following on each fabric:

```
configuration timing> switchclock primary <bnp>
configuration timing> switchclock secondary <bnp>
configuration timing> mode tcm
```

Then configure the following on the TCM using EMI:

```
configuration timing> primary fabric (1 | 2 | 3 | 4)
(primary | secondary)
configuration timing> secondary fabric (1 | 2 | 3 | 4)
(primary | secondary)
configuration timing> mode automatic
```

If you are using BITS mode, use AMI to enter the following on each fabric:

```
configuration timing> switchclock primary none
configuration timing> switchclock secondary none
configuration timing> mode tcm
```

Then configure the following on the TCM using EMI:

```
configuration timing> mode bits
```

SPVC Batch Files - Because *ForeThought* 5.3.x adds support for SPVPs, any previous batch files that include SPVC commands must be edited to change the syntax of the commands. The syntax for `configuration spvc spans` has changed to `configuration spvx spvcc spans`. The syntax for `configuration spvc pnni` has changed to `configuration spvx spvcc pnni`. Additionally, the `<destprefix:destport>` option under `configuration spvx spvcc pnni new` is no longer supported. It must be replaced with a value for `<destnsap>`. See the next note for more information.

Format of SPVC New Command - The format for `configuration spvx spvcc pnni new` previously accepted either a `<destprefix:destport>` parameter or a `<destnsap>` parameter. *ForeThought* 5.3.x now only accepts a `<destnsap>` parameter. Existing SPVCs are not affected. When creating a new SPVC, if the destination switch is running *ForeThought* 5.3.x, you can obtain the destination NSAP address to be used in this parameter by entering `conf spvx spvcc pnni destnsap` on the destination switch. See Section 11.1.2.3 in Part 2 of the *AMI Configuration Commands Reference Manual* for more information. However, if the destination switch is running a pre-*ForeThought* 5.3.x release, you have to compute the destination NSAP address just as you did in previous releases. See Section 5.2 of this document for a description of how to compute the destination NSAP address.

4.1.2 FT 5.x Releases

The following section discusses upgrade items that changed in the *ForeThought* 5.0.x, *ForeThought* 5.1.x, and *ForeThought* 5.2.x releases. They are re-printed here for the convenience of users who are still running releases of software earlier than these.

E.164 Address Format - In earlier *ForeThought* releases, it was possible to create a signalling interface using the E.164 address format and specifying the `-type` as `auto`. This results in the interface coming up as PNNI or FT-PNNI with the E.164 address format enabled, which is not a valid combination. When you create a signalling interface using the E.164 address format in *ForeThought* 5.2.x or greater, you must specify the `-type` as `publicUNI`. Upon upgrading to *ForeThought* 5.2.x or greater, any signalling interfaces that used the E.164 address format and used a `-type` of `auto` are automatically changed to use the E.164 address format, a `-type` of `publicUNI`, and `-ilmireg` of `disable`. Also, any signalling interfaces that used the E.164 address format and used a `-type` other than `auto` or `publicUNI` are automatically changed to use a private address format while retaining the configured `-type`.

User Password Changes - Releases prior to *ForeThought* 5.x supported only one AMI login profile, accessible through the login ids `ami` or `asx`. When you first upgrade to *ForeThought* 5.x, the switch software creates two separate default userids: `ami` and `asx`. Both are configured with `local` authentication, `admin` privileges, and `all` access. If a pre-*ForeThought* 5.x password file already existed, both userids are assigned that same password. If a pre-*ForeThought* 5.x password file did not exist, both userids are assigned a null password.

LES/BUS Platform Location - In *ForeThought* 5.x, the LES and BUS for an ELAN must always be located on the same platform (co-located); e.g., if switch A is providing a LES for an ELAN, it will act as a BUS as well. If you have previously run the LES and the BUS on different platforms, re-configure your switch before upgrading. Otherwise, the BUS will be deleted from the CDB, the LES will not be recreated, and a warning message will be written to the console.

Memory Pools and PVC Capacity - *ForeThought* 5.x lets you configure the amount of memory allocated for call processing. The default memory pools setting is 2.5 MB. On a 16 MB SCP, this leaves room for 6500 PVCs. On a 64 MB SCP, this leaves room for 25,000 PVCs. If you have more PVCs configured in an earlier *ForeThought* release, back up your CDB before performing the upgrade. After the upgrade, change the memory pool setting to 0, and then restore the old CDB.

Overbooking Factors - The maximum overbooking factor for both link and path overbooking has been changed from 99,999 to 32,767. When upgrading, overbooking factors which are between 32,768 and 99,999 are changed to 32,767. The changes are updated in the CDB.

UPC Contract Index - Switches are typically configured with approximately 20 UPC contracts, each of which is given a unique numeric index. In pre-*ForeThought* 5.x releases, this index had a maximum value of roughly 2 billion. *ForeThought* 5.x lowers the maximum UPC index value to 32,767. Your UPC index numbers should typically have low values and will be converted transparently. If you have used values above 32,767 for UPC contract indexes, you must delete these contracts and re-create them with indexes below 32,767, and delete and re-create any PVCs or SPVCs using those UPCs. Otherwise, the UPCs and circuits will not be re-created under *ForeThought* 5.x. (A warning is printed to the console for any such UPC contract. If no warning appears, there were no illegal contracts in your configuration.)

Number of LANE Clients on a Switch - As with earlier *ForeThought* releases, the maximum number of LANE clients resident on an SCP is 16. This limit was not enforced in earlier releases. In *ForeThought* 5.x it is enforced, so you will not be able to configure a 17th client.

Old Panic Records - Panic records are automatically removed upon upgrading your switches to *ForeThought* 5.x. If you execute the **oper panic show** command, a message is displayed saying, There is no panic dump to show you.

Timing Configuration - If distributed timing had been previously configured on a switch with a pre-*ForeThought* 5.x release, that timing configuration will be lost when it is upgraded to *ForeThought* 5.x. An explanation of the new distributed timing feature and examples of how to configure timing using the new method are provided in the *ATM Switch Network Configuration Manual*.

Change to Series LC and Series LE Memory Models - The values in the `Mcasts` field and `Cells` field in memory models 5 and 8 have changed in *ForeThought* 5.x for the **conf module traffic lc models** and the **conf module traffic le models** commands. See Part 1 of the *AMI Configuration Commands Reference Manual* for more information.

Configurable Switch Prompt - To make it easier to identify switches, the switch prompt is now configurable via the AMI command `conf system prompt <new-prompt>`. This command allows the user to replace the old `localhost::>` prompt with any ASCII string. Upon upgrading to this release, the default switch prompt has been modified to use the switch name. If no switch name has been configured (using `conf switch name`), the prompt defaults to `ATM SWITCH::>`.

After an `oper cdb init`, the prompt defaults to `ATM SWITCH::>` and, if the switch name is ever changed, the switch prompt defaults to the new name. If the switch name and configured prompt were different, you will have to modify the prompt again.

If you open a remote AMI session using the open command, an asterisk (*) is displayed in front of the remote switch's prompt to distinguish it from the local switch's prompt. The remote switch prompt always uses the remote switch's name for the prompt. To return to the local switch, you must type `localhost`.

4.2   Configuration Considerations

4.2.1 FT 5.3 Release

The following section discusses configuration issues that pertain specifically to *ForeThought* 5.3.x.

Element Manager Interface - The embedded web-based Element Manager utility provides monitoring and configuration access to most, but not all, of the capabilities that users can control with the AMI utility. In future releases web-based management will be expanded and more capabilities will be configurable through it.

***FramePlus* Network Module** - If a Frame Relay network module with faulty hardware is installed or is already resident in a switch, the `Admin State` of that network module is forced to `down` to stop the switch from trying to communicate with the faulty network module. If the network module is replaced with a functioning network module, you must admin up the new network module using `conf module admin <module> up` to bring it on line.

Idle Channel Suppression for CAS - When idle channel suppression is enabled for CAS connections, a ringing tone occurs within 60 times of the configured idle integration period. (A ringing tone is a ring and pause while the connection is trying to be established.) For example, when the default idle integration period of 1000 ms is used, the ringing tone is heard for up to 60 seconds. During this period the ringing tone is received and heard at the calling end. If the period elapses without a connection being established, the line goes silent at the calling end. However, the ringing tone is still heard at the receiving end until the phone is on-hook at the calling end.

Connection Preservation - Connection Preservation for PVCs and PVPs is supported on all network modules and switch platforms, except *FramePlus* network modules, and *ForeRunnerLE* 155 and *ForeRunnerLE* 25 switches. Connection preservation is enabled by default on all switches, except *ASX*-200BX and *TNX*-210 switches. Connection preservation should be enabled on these two platforms only if these switches are using an Uninterruptable Power Supply (UPS).

Idle Channel Suppression - In environments in which service disruptions are especially critical, customers should power switches through an Uninterruptable Power Supply (UPS). This will provide better protection for SVC and SPVC loss during momentary power disruptions. On ASX-200BX and TNX-210 switches, it also allows use of the new Connection Preservation for PVCs and PVPs capability, and preserves the Idle Channel Suppression state of circuit emulation PVC connections. If the ASX-200BX or TNX-210 switch is not protected with a UPS, connection preservation will not work, and the Idle Channel Suppression state may be reset to OFF in the interval between a switch reset and a CEM call setup and tear down. The ASX-4000 and ASX-1000 support Connection Preservation for PVCs and PVPs whether or not a UPS is installed, and the ASX-1000 also preserves the idle state even without a UPS. UPS protection is still worth considering, to protect SVCs and SPVCs.

4.2.2 FT 5.x Releases

The following section discusses configuration items that changed in the *ForeThought* 5.0.x, *ForeThought* 5.1.x, and *ForeThought* 5.2.x releases. They are re-printed here for the convenience of users who are still running releases of software earlier than these.

***FramePlus* Line Framing** - The *FramePlus* network module provides the user with the ability to configure DS1 line framing to either Extended Superframe (ESF) or Superframe (SF) formats. It should be noted that while both line framing schemes are supported, Frame Relay or FUNI services being supported over SF line framing may experience data corruption during line alarm conditions, specifically RAI. This corruption is a result of the inherent structure of the SF framing format.

CEC-Plus Interface - The user interface to the Timing Control Module (TCM) is called the Extended Management Interface (EMI). Although EMI on the TCM and AMI on the switch are similar in structure, they are not identical. For example, command line editing is not available in EMI. For information about the commands that are available in EMI, see the *CEC-Plus Installation and User's Manual*.

ATM FUNI Services - The *FramePlus* network module supports ATM FUNI service that is compliant with the ATM Forum Frame Based User-To-Network Interface (FUNI) Specification, Version 2.0 mode of operation 1a. Mode 1a provides the following FUNI service profile: Full or fractional services up to DS1/E1 line rate, AAL5 PDU adaptation, 2 octet frame header, 2 octet CRC, maximum FUNI frames size of 4,096 octets, up to 512 user VCCs, and at least 16 concurrent frame reassembly instances. The *FramePlus* module supports ATM FUNI PVC connections. The *FramePlus* module does not support signalled connections, or in-band ILMI signalling per the ATM Forum UNI 3.1 or UNI 4.0 Specifications.

PVC Capacity on *FramePlus* Network Modules - The number of services and PVCs that can be supported on a *FramePlus* network module depends upon the amount of memory in the SCP that is installed in the switch fabric. To support the maximum number of services (124) and PVCs (1,012) on a *FramePlus* network module, an SCP with 16MB DRAM and 4MB FLASH, or greater, is required.

FramePlus Service License Keys - The *FramePlus* network module may be configured to support either Frame Relay or ATM FUNI services at a module level. Frame Relay services are enabled by default; no application key is required. If you wish to enable FUNI services, you are required to enter a FUNI application key using the `conf module fram application <module> <application_key>` command. To obtain a FUNI service application key, please contact the FORE Technical Assistance Center (TAC) as specified in Section 6.0 of this document. However, if you wish to use Frame Relay services after you have been running FUNI services, you must enter a Frame Relay application key. The Frame Relay service application keys are generally available. For your convenience, a valid Frame Relay key is published in Section 1.12.2.1 in Part 1 of the *AMI Configuration Commands Reference Manual.*

Frame Relay Services - The *FramePlus* network module supports Frame Relay services that are compliant with the Frame Relay Forum's FRF.8 Frame Relay/ATM PVC Service Interworking Implementation Agreement, FRF.1.1 Frame Relay User-to-Network Implementation Agreement, and FRF.3 Multiprotocol Encapsulation Over Frame Relaying Networks Implementation Agreement. The *FramePlus* module specifically supports both FRF.8 upper layer user protocol encapsulation modes of operation: Mode 1 - Transparent Mode and Mode 2 - Translation Mode.

FramePlus to Voice Plus™ Connectivity / Interoperability - The *ForeThought* 5.2.x code release does not permit the establishment of connections between *FramePlus* network module (Frame Relay or FUNI) and *Voice Plus* (ATM Circuit Emulation) network module ports. This limitation is system-wide and is due to inherent interoperability limitations between the FRF.8 (AAL5) and ATMF CES-IS v2.0 (AAL1) specifications.

POST Support on FramePlus Network Modules - The *FramePlus* network module is an intelligent interface card that has its own processor. Upon a reset, the module runs a power-on self test (POST) to verify the integrity of the hardware. This POST takes about 25 seconds to complete. The network module may take up to an additional 35 seconds to come back on-line, if a large number of PVCs and services need to be recreated. When the POST is complete, the `Operational State` under `conf mod fram display` shows `appluprunning`.

FramePlus Network Module as a Timing Source - When using a *FramePlus* network module as the primary source or both the primary and secondary sources of timing for a CEC-Plus, there is a slight delay before the TCM can lock onto the source because it cannot lock until the POST is complete.

Resetting the CDB - In an extreme condition, when there is very little memory left in the FLASH, the switch may come back up with the same CDB after performing an `oper cdb reset`. If this happens, use the `oper flash free` command to see how much space is left. (This operation may take a few minutes to complete.) Perform an `oper flash dir` to list the contents of the FLASH. Use `oper flash delete` to remove any unnecessary files. An `oper cdb reset` should now complete successfully.

4.3   Known Problems and Limitations

4.3.1 FT 5.3 Release

The following section discusses known problems and limitations that pertain specifically to *ForeThought* 5.3.x.

Connecting an SVA and a Switch - When using the *StreamRunner* SVA software, versions 5.0.x and earlier to manage an AVA or ATV device directly connected to a FORE ATM switch running *ForeThought* 5.3 switch software or later exhibits a problem. This is because of a problem in the SVA software's implementation of the ATM Forum's ILMI protocol. When the problem occurs, the SVA manager does not start up correctly, and it may write errors to its console or log indicating trouble communicating with the switch.

SVA software versions later than 5.0.x will correct this problem. Currently, a patch can be used with 5.0.x or earlier versions. The patch consists of a shared library (Solaris and IRIX versions) or a DLL (Windows NT), which should be copied over the file with the same name in the SVA installation already on your workstation or PC.

Perform the following steps to install the patch:

1. Obtain the patch from FORE Systems TAC (See Section 5).
2. Quit all running SVA managers and applications using the SVA installation.
3. Locate the SVA installation directory.
4. On Solaris and IRIX workstations, copy the new `libilmi.so.1` file into the SVA `lib` directory. On Windows NT PCs, copy the new `libilmi.dll` file into the SVA `bin` directory.

> **NOTE** You may need to have root or administrator access to overwrite the files.

5. Restart your SVA managers and applications.

UNI between Switch and Windows 98/NT 5.0 (Beta) Adapters - When a UNI link is created using auto-configuration between a switch and a Windows 98 or Windows NT 5.0 (Beta) adapter, the switch queries for the UNI type. The adapter returns a value of public UNI when it should be returning a value of private UNI. This causes the auto-configuration procedures to fail. To avoid this, do not use auto-configuration on UNI links connected to a Windows98 or Windows NT 5.0 (Beta) machine. Instead, manually configure the interface using the command `conf sig new` *<port>* *<vpi>* `-version uni31 -type privateUNI`.

Call Records for SVPs and SPVPs - Call record generation is not supported for SVPs and SPVPs.

CEC-Plus Upgrades - The timing configuration parameters for a CEC-Plus must be re-configured after upgrading to *ForeThought* 5.3. See Section 4.1.1 for details.

Some SNMP Variables Shown as Numbers in the Element Manager - A few of the SNMP variables are displayed only as numbers in the Element Manager, whereas a text description is displayed for them in AMI.

Incorrect Parameters Shown in Element Manager for LE 25 - For LE 25 switches, the `Priority` field shows incorrect parameters in both the port series traffic management configuration screen and in the statistics table. The `Priority` field shows `NRT` and `RT` when it should actually show `CBR` or `VBR-ABR-UBR` depending on the priority.

Idle Channel Suppression in the Element Manager - Idle channel suppression can be configured through the Element Manager; however, when you view that information an error message is displayed on the switch console.

Limited *FramePlus* Support in Element Manager - Frame Relay/FUNI UPC contracts, PVCs, profiles, and services cannot be created via the Element Manager. You can, however, create Frame Relay/FUNI UPC contracts, PVCs, profiles, and services via AMI.

NSAP Filters Creation via the Element Manager - Currently, the creation of NSAP filters using the Element Manager is not supported. You can, however, create NSAP filters using AMI.

Configuring Distributed Timing via the Element Manager - When configuring distributed timing on an ASX-1000 or TNX-1100 using the Element Manager, the switch clock cannot be set to a port on another fabric. This functionality is supported using AMI.

Creating an FRF.8 Profile via the Element Manager - You cannot set the `DE to CLP` field to `ignored`, nor can you set the `CLP` field to `0` or `1` when creating an FRF.8 Frame Relay profile via the Element Manager. However, you can still successfully set these values in an FRF.8 profile via AMI.

Specifying the Other WKA via the Element Manager - Specifying a well-known address (WKA) other than the ATM Forum WKA does not work properly in the Element Manager. Although you can select the `other` option, you are not allowed to specify the address for the `other` WKA. You can specify the `other` WKA address using AMI.

Using SecurID with the Element Manager - If you try to perform a SecurID login to the Element Manager and you are rejected because the SecurID server is down, the Element Manager simply regenerates the same Password Authentication page. However, you do not receive an error message that the SecurID server is down and that you now need to enter a local password instead.

Viewing Network Modules via the Element Manager - When using Netscape 3.x for Unix platforms and viewing the *ASX*-1000, *TNX*-1100, or *ASX*-4000 via the Element Manager, the delineation between network modules is not always clear. For example, network modules that are directly side by side such as 1A and 1C do not show a demarcation point, and instead look like a single, larger network module. However, if no network module or port card is plugged into slots 1A and 1C, a definitive line is displayed between the slots. This is a limitation of Netscape 3.x on UNIX platforms.

Port UpTime Field in Element Manager - The port hardware `UpTime` field does not function properly when admining the port up and down on any network module. When the port is admined down, this field does not reflect that fact and maintains the same uptime count as all of the other ports on the network module.

CEC-Plus Build Number - The specific software build number does not appear in the banner that is displayed when you log into a TCM. However, the specific build number is displayed under `conf tcm show`.

***FramePlus* Call and Performance Records** - The *FramePlus* network module does not export either call or performance records.

Creating Index Values via the Element Manager - One specific difference between AMI and the embedded web interface is how index values are specified for UPCs, SPVCs, and SPVPs. In AMI, the user must select an available index; in the web interface, an available value is automatically provided. If you need to control the index values, you will want to use AMI (and you are probably already planning to use it because of its scripting capabilities, which the embedded web interface does not offer). In future releases, we are considering allowing users to override the index value selected by the web interface.

Using the Element Manager and AMI Simultaneously - If you attempt to query a switch using the Element Manager and AMI simultaneously, a situation can arise in which the combined memory requirements are too great. In such cases, you are logged out of both Element Manager and AMI with no other consequences, and you receive an error message. This situation most often occurs when a query is made under the `statistics` or `conf atmroute` menus.

UNI Signalling between TS-2800 and Switch - If the connection between a TS-2800 and a switch is configured for automatic detection of the UNI version, the connection gets established. However, if the fiber connection is broken and then restored, the switch indicates that ILMI is UP, but UNI is DOWN. This problem does not occur if the TS-2800 is hard configured for either UNI3.0 or UNI 3.1 instead of automatic detection.

4.3.2 FT 5.x Releases

The following section discusses known problems and limitations that changed in the *ForeThought* 5.0.x, *ForeThought* 5.1.x, and *ForeThought* 5.2.x releases. They are re-printed here for the convenience of users who are still running releases of software earlier than these.

Advanced Options in UPC Contracts - When creating a UPC contract that uses the advanced options, the software automatically maps the Frame Relay parameters to ATM parameters. The mapping is performed based on method 2 in Appendix A of the B-ICI Specification, Version 1.1. Although this is a useful tool, occasionally some of these mappings may result in a UPC contract that returns invalid ATM parameters. An invalid contract is noted by a suspicious traffic contract debug error message in the syslog, and should not be applied to any PVCs. You should delete the invalid contract and recreate it without using the advanced options.

***FramePlus* Local Frame Switching** - The *FramePlus* network module does not permit the establishment of Frame-to-Frame connections across a single fabric. This restriction prevents connections between *FramePlus* ports located on the same network module, or *FramePlus* ports located across separate modules, but attached to the same switch fabric.

FramePlus PMP Connections - The *FramePlus* network module does not permit the establishment of either frame-to-cell or cell-to-frame point-to-multipoint (PMP) virtual connections.

Anycast Signalling - Basic anycast signalling is fully supported, but the optional "connection scope" call setup attribute is not.

Trap Generated Twice - The Enterprise Specific Trap (29 asxLinkUp) is generated twice for each port when a *FramePlus* network module is administered up from the down state.

Upgrading a *FramePlus* Network Module - On rare occasions, while upgrading the software on the *FramePlus* network module, the operation fails with the following message:

```
{Netmod aborted download.}
Transfer failed {Netmod aborted download.}.
Reset the network module [n] ?
```

You should respond with **n** to the reset question and perform the upgrade again. The upgrade should now complete successfully.

Call Records on Series D Network Modules - Call Records do not report the additional counters that are supported by the Series D network modules.

5.0 Special Information

5.1   AMI Conversion Tables

The following table lists the AMI commands that have been moved, renamed, or replaced between *ForeThought* 5.2.x and *ForeThought* 5.3.x.

ForeThought 5.2.x Command	*ForeThought* 5.3.x Equivalent
`conf board clockscale`	`conf switch clockscale`
`conf board oam`	`conf switch oam`
`conf board show advanced`	`display hdcomp`
`conf ip mask`	`conf  ip  address  <interface> <address> [<netmask>] [(up)]`
`conf fram module display`	`conf fram module show`
`conf fram module  show`	`conf fram module show advanced`
`conf signalling show atm`	`conf signalling show atm and conf signalling show atmranges`
`conf spvc`	`conf spvx spvcc`
`debug trace signalling spvc`	`debug trace signalling spans spansspvc`
`stat aal0`	`stat scp aal0`
`stat aal4`	`stat scp aal4`
`stat aal5`	`stat scp aal5`
`stat atm`	`stat scp atminterface`
`stat board`[1]	`stat atm inputlookuperrors show`
`stat ctlport`	`stat scp ctlport`
`stat icmp`	`stat scp icmp`
`stat interface`	`stat scp interface`
`stat ip`	`stat scp ip`
`stat tcp`	`stat scp tcp`
`stat udp`	`stat scp udp`

[1.] The command `stat board` still exists, but it now shows different information. To display the information that used to be shown there, use `stat atm inputlookuperrors show`.

The software for the *ForeRunnerLE* 155 and *ForeRunnerLE* 25 switches, and for the *ASX*-4000 switches only display commands that are applicable to that switch platform (e.g., commands for configuring DS1 network modules are not available on these platforms).

The following table lists the AMI commands that have been moved, renamed, or replaced between *ForeThought* 4.1.x or SP 1.0.x and *ForeThought* 5.x.

ForeThought 4.1.x or SP 1.0.x Command	*ForeThought* 5.x Equivalent
`conf av>`	`conf security nsapfiltering>`
`conf board topology`	`display atmroute spans map`
`conf board timing`	`conf timing switchclock`
`conf module timing`	`conf timing switchclock`
`conf nsap av>`	`conf security nsapfiltering>`
`conf nsap dtl>`	`conf atmroute ftpnni dtl>`
`conf nsap route>`	`conf atmroute ftpnni staticroute>`
`conf snmp trap`	`conf snmp trap destinations`
`conf topology forepnni>`	`conf atmroute ftpnni>`
`conf topology spans>`	`conf atmroute spans>`
`conf uni>`	`conf signalling>`
`oper password`	`conf security login password`

The `conf av` and `conf nsap av` menus that were under the old address validation feature filtered calls based only on the calling (source) address. They have been replaced by `conf security nsapfiltering`, which is a new feature that filters calls based on a combination of the calling (source) and called (destination) addresses, as well as the source ports, VPIs, NSAP addresses, and NSAP address masks, and the destination ports, VPIs, NSAP addresses, and NSAP address masks.

The `conf board timing` and `conf module timing` commands have not moved to, but have been replaced by, a simplified method of timing under `conf timing switchclock`.

5.2   Computing the Destination NSAP for a Pre-FT 5.3 Switch

As explained in Section 4.1.1 of this document, if you are creating an SPVC and the destination switch is running a pre-*ForeThought* 5.3.x release, you must use the following method of computing the destination NSAP:

1. The first 13 bytes of the destination NSAP address are the same as the prefix of the routing domain on the destination switch. Use **conf atmr domain show** on the destination switch to obtain this prefix.

2. The next four bytes of the destination NSAP address is a constant value: **0020480d** (given in hexadecimal format).

3. The next two bytes of the destination NSAP address depend on the destination port. Each port in a switch has a port identifier that uniquely defines the port. This identifier should be encoded in the next two bytes. Please see Tables A.1 through A.13 in Appendix A in the *ATM Switch Network Configuration Manual* for the port numbering schemes of the various switches.

    For example, the port identifier for port 2b2 on an *ASX*-1000 or *TNX*-1100 (as shown in Table A.3) is 66, which represented using 2 bytes in hexadecimal is **0042**.

4. The last byte of the destination NSAP address is not significant for routing purposes and can be encoded to zeroes (**00**).

Here are some examples:

Example 1:

Suppose the destination switch is an *ASX*-200BX running *ForeThought* 5.2.x. Its routing domain's prefix is 0x47.3000.00.000000.0000.0000.0054 and the destination port is 1c4. The port identifier for port 1c4 is 19, which is 13 in hexadecimal. The destination NSAP address is computed as follows:

<0x47.3000.00.000000.0000.0000.0054> + <0020480d> + <0013> + <00>

which is 0x47.3000000000000000000000054.0020480d0013.00

Example 2:

Suppose the destination switch is an ASX-1000 switch running *ForeThought* 5.0.x. Its routing domain's prefix is 0x47.0005.80.ffe100.0000.f21a.37fe and the destination port is 3d2. The port identifier for port 3d2 is 139, which is 8b in hexadecimal. The destination NSAP address is computed as follows:

<0x47.0005.80.ffe100.0000.f21a.37fe> + <0020480d> + <008b> + <00>

which is 0x47.000580ffe1000000f21a37fe.0020480d008b.00

5.3   Modifications to the Switch Manuals

The following is a correction to Part 1 of the *AMI Configuration Commands Reference Manual:*

- In Section 10.1, the parameters and definitions for the **conf http help_url** command have changed. The usage is now as follows:

    configuration http help_url (**default** |
  (**http**[**s**]|**file**|**ftp**)**://***<server>*[**:***<port>*][*<path>*])

These parameters are defined as follows:

Parameter	Description
default	After you have specified a non-default location, entering **default** changes the location of the help files back to the default location of FORE Systems' external web site.
(http[s] | file | ftp)://	Entering **http** indicates an http server. Entering **https** indicates a secure http server. Entering **file** indicates the UNIX workstation or PC from which you access the switch. Entering **ftp** indicates an ftp server.
<server>	The IP address or DNS name of the web server to contact.
[:port]	The port on the web server to contact.
<path>	The directory on the web server into which the help files should be put.

For example, to specify a secure server, you could enter something similar to the following:

conf http help_url https://secure-server/us/bob/help

To specify an ftp server, you could enter something similar to the following:

conf http help_url ftp://ftp-server/public/help

To specify a local workstation, you could enter something similar to the following:

conf http help_url file:///C:\HELPFILES

> **NOTE** When indicating a local workstation, the *<server>* is not specified.

The following is a correction to Part 2 of the *AMI Configuration Commands Reference Manual:*

- In Section 2.6.8, 2.7.7, 2.14.1.7, and 2.14.2.6, the output of the following commands has changed slightly:

  - **conf port cesds1 show**

  - **conf port cese1 show**

  - **conf port iwf ds1 show**

  - **conf port iwf e1 show**

  If a Circuit Emulation port is running in unstructured mode, the framing mode for that port is overridden, therefore the Framing Mode, CRC, and TS16 fields all display N/A.

The following are corrections to the *ATM Switch Network Configuration Manual:*

- In Appendix A, the following SNMP traps should be added to Table A.14:

Trap Number	Trap Name	Description
1091	asxQ2931Down	This trap is generated whenever UNI signalling goes down.
1092	asxQ2931Up	This trap is generated whenever UNI signalling goes up.
1093	asxFabricDown	An asxFabricDown trap signifies that the sending protocol entity recognizes a failure in one of the *ASX*-4000 ATM Switch fabrics, that is identified by the board number. This is probably caused by a hot-swap of a fabric module.
1094	asxFabricUp	An asxFabricUp trap signifies that the sending protocol entity recognizes a new operational ATM *ASX*-4000 Switch fabric, that is identified by the board number. This is probably caused by a hot-swap of a fabric module.

- In Section 9.3.1, the second paragraph should read as follows:

    If both the primary and secondary values fail, the switch fabric uses the crystal of the first available timing network module as the switchclock, going from A to D. For example, if network module A supports distributed timing, then the crystal from A is used as the switchclock. As another example, if network module A is not installed, and B and C do not support distributed timing, but D does support distributed timing, then the crystal from D is used as the switchclock. If the crystal of the network module has to be used for timing support, other ports from other fabrics can use that particular network module crystal as their timing reference. The network module crystal is of Stratum 4 level accuracy.

The following are corrections to the *ForeRunnerLE 25 and 155 ATM Workgroup Switch Installation Manual*:

- In Sections B.1.1 and B.1.2, the LE25 and LE155 power supply specifications should be 100-127VAC to 200-250VAC@50/60Hz, 2.2 to 4.2 amps.
- In Section B.2.4, the synchronous transfer mode (STM) for the 155 Mbps MM PEM should be STM-1, not STM-4c.
- In Section B.1.1, the dimensions of the *ForeRunnerLE* 25 should be:

    Width: 17.500" (44.45 cm)

    Height: 3.138" (7.97 cm)

    Depth: 11.977" (30.42 cm)

The following is a correction to the *ForeRunner ASX-4000 ATM Switch Installation and Maintenance Manual*:

- In Section 2.3.2.2, the procedures for the relay rack (mid-mount) installation have changed. The procedures are now as follows:

Depending on your rack-mount kit (HWKT0009 for 19" mid-mount, HWKT0010 for 23" mid-mount), the following parts should be included in the kit:

Quantity	Part Description	Part Number
1	mid-mount shelf	HWSH0216
4	shelf brackets	HWSH0217 (19" racks only) HWSH0218 (23" racks only)
8	standoffs	HWSP0048
1	left adapter	HWSH0212-0001 (23" racks only)
1	right adapter	HWSH0212-0002 (23" racks only)
34	#10-32x.5 pan head, Phillips screws	HWSH0209
36	#12-24x.375 pan head, Phillips screws	HWSC0212

1. Attach the four brackets to the shelf (two brackets on each side).
   a. Locate the six mounting holes on each side of the shelf.
   b. Align the three mounting holes on the bracket with the three mounting holes on the side of the shelf and secure using the #10-32x.5 screws provided. Leave the front or rear bracket loose to adjust when installing the shelf into the rack.
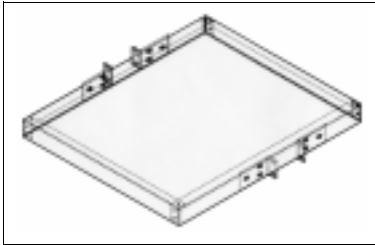   c. Repeat steps 1a and 1b for the remaining three brackets. The finished installation should look like Figure 1.

Figure 1 - Finished Bracket Installation

2. Attach the shelf to the rack.

    a. Position the shelf between the two rack posts. Make sure the rack posts are positioned between the brackets on both sides of the shelf.

    NOTE ▶ When choosing a shelf position, take the height of the switch (56") into consideration. Use the lowest rack position available to ensure rack stability and enough clearance to install the switch.

    b. Once the shelf is properly positioned, tighten the front or rear brackets.

    c. Align the two mounting holes on the brackets with the mounting holes on the rack and secure using the #12-24x.375 screws provided. The finished shelf installation should look like Figure 2.

Figure 2 - Finished Shelf Installation

3. Install the eight U-shaped standoffs to the rack (four on each side). The standoffs are used to secure the front of the switch to the rack posts.

    NOTE ▶ The measurements outlined in the following table may help when positioning the standoffs on the rack. Following these guidelines will ensure that when the switch is ready to be installed into the rack, the mounting holes on the standoffs (or adapters for 23" racks) will align with the mounting holes on the switch.

| Reference	Description	Measurement
A	Starting from the shelf and working up the rack, the distance from the bottom rack mounting hole of the shelf bracket to the bottom slotted hole of the first standoff.	12.25"
B	Distance from the bottom mounting hole of the first standoff to the bottom slotted hole of the second standoff.	10.5"
C	Distance from the bottom tapped hole of the second standoff to the bottom slotted hole of the third standoff.	10.5"
D	Distance from the bottom tapped hole of the third standoff to the bottom slotted hole of the fourth standoff.	15.75"
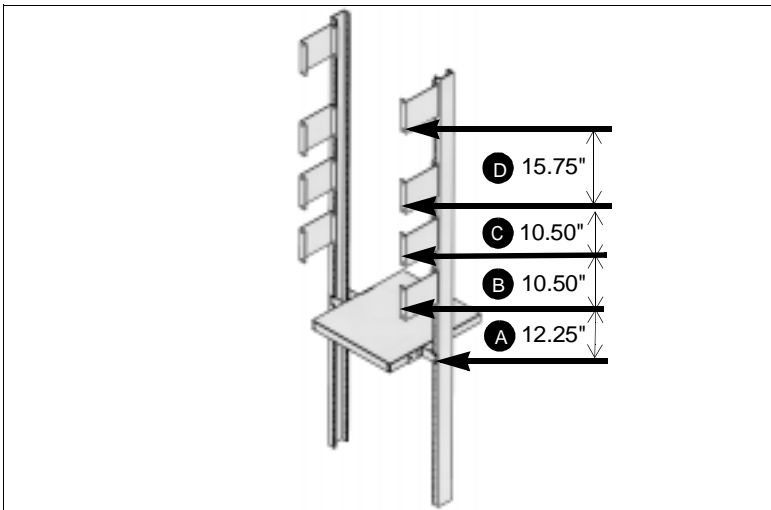
Figure 3 - Positioning Standoffs

a. Align the two slotted holes on one end of the standoff with the mounting holes on the rack and secure using the #12-24x.375 rack mount screws provided.

b. Repeat step 3a for each standoff.

4. If you are using a 19" rack, skip to step 5. If you are using a 23" rack, install the right and left rack adapters to the switch. The adapters extend the width of the switch so that the switch can be installed in a 23" rack.

   a. Align the 11 mounting holes on one side of the adapter with the mounting holes on the switch flanges and secure using the #10-32x.5 screws provided.

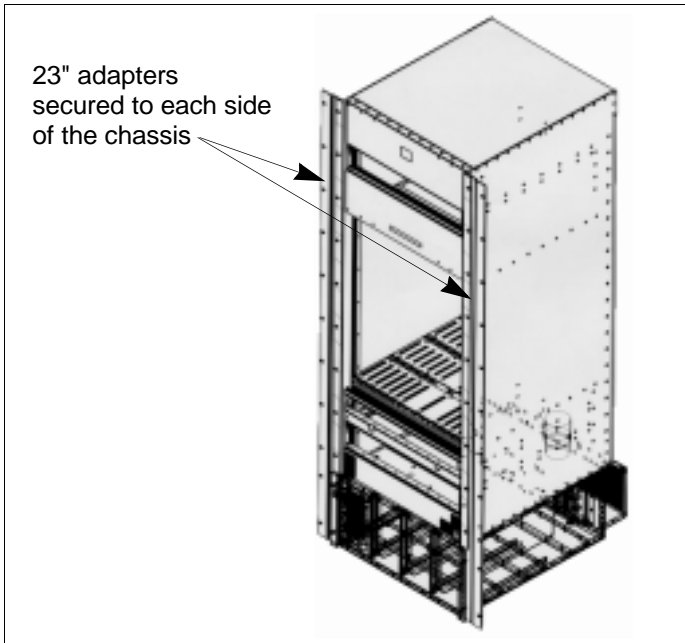   b. Repeat step 2a for the other adapter. The finished installation should look like Figure 4.

Figure 4 - Finished Adapter Installation

5. Install the switch into the rack.

CAUTION

Because of the unit's weight, two people should lift the unit to place it in the equipment rack. Do NOT lift the ASX-4000 switch chassis by yourself.

a. With a person standing at each side of the switch, grasp the bottom edge of the chassis with one hand near the front and the other near the back and slowly lift the chassis in unison.

b. Carefully place the chassis on top of the shelf with the front of the switch facing forward and flush with the front of the shelf.

c. Align the mounting holes on the switch with the mounting holes on the standoffs and secure using the #12-24x.375 screws provided. The finished installation should look like Figure 5.
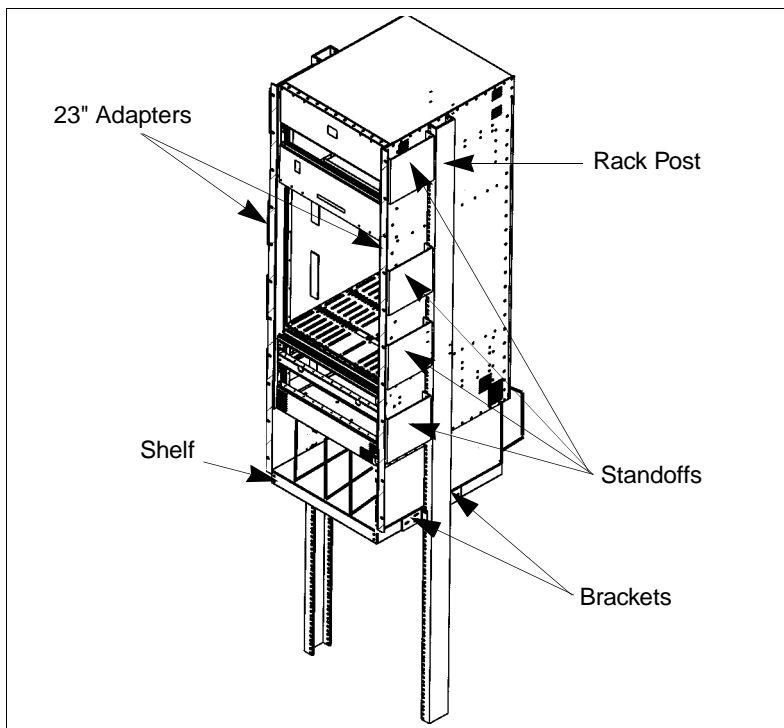

Figure 5 - Finished Chassis Installation

6.0 Contacting Technical Support

In the U.S.A., customers can reach FORE Systems' Technical Assistance Center (TAC) using any one of the following methods:

1. Select the "Support" link from FORE's World Wide Web page:

    http://www.fore.com/

2. Send questions, via e-mail, to:

    support@fore.com

3. Telephone questions to "support" at:

    800-671-FORE (3673) or **724-742-6999**

4. FAX questions to "support" at:

    724-742-7900

Technical support for customers outside the United States should be handled through the local distributor or via telephone at the following number:

+1 724-742-6999

No matter which method is used to reach FORE Support, customers should be ready to provide the following:

- A support contract ID number
- The serial number of each product in question
- All relevant information describing the problem or question